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- Then the following schema for three main lectures:
  - I. life-cycle labour supply decisions and human capital,
  - II. consumer behaviour and revealed preference,
  - III. earnings dynamics and consumption inequality.

Why these three topics?
- Draw quite a bit from my own papers (!) - all available on my website.
- The final lecture will draw out some of the underlying ideas from Nemmers lecture which I have been asked to write up as a monograph.

In this session I will run through the main ideas behind each of the Lectures I, II and III and pick out some of the key modelling challenges to be addressed in each case.
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Lecture 0/I: Labour Supply Models and Policy Analysis

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- Intertemporal Labor Supply, Human Capital and Experience Dynamics.

References from my webpage, including:
2. Blundell and Shephard (2012, REStud), microeconometric choice models and optimal design...
3. Blundell, Bozio and Laroque (2011, AER), the role of the extensive margin..
4. Blundell, Costa-Dias, Meghir and Shaw (2016, Econometrica), human capital and experience dynamics..

Intertemporal Labor Supply, Human Capital and Experience Dynamics.

Incorporating Restrictions on Hours Choices (maybe...).

Collective Models and Family Labour Supply (maybe...).
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Developing the empirical foundations for policy reform & design.

Reflecting on the *Mirrlees Review*, consider the role of evidence loosely organised under five headings:

1. Key margins of adjustment.
3. The importance of information and complexity.
4. Evidence on the size of responses.
5. Counterfactual policy simulation and (optimal) design.

A key challenge in this work is developing a robust empirical model that reflects the facts in the data and allows counterfactual simulations - the main motivation for structural microeconometric models.

Draw from experience in the evaluation of labour supply and tax policy. Some key facts about wages, employment and hours...
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Some key facts about wages, employment and hours....
Average Log Wages of Women by Age

Notes: UK Women, BHPS. Source: Blundell, Dias, Meghir and Shaw (2016)
Female Labour Market Attachment and Part-time Work

Notes: UK Women, BHPS. Source: Blundell, Dias, Meghir and Shaw (2016)
Some key facts . . . .

- **A lifetime view of employment and hours**
  - differences by *extensive and intensive* margin accentuated at particular ages and for particular demographic groups,
  - higher attachment to the labor market for higher educated, career length matters, see also Blundell, Bozio and Laroque (2011).

- **Wages grow stronger and longer over the lifetime for higher educated**
  - human capital profiles in work appear to be complementary to education investments.
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- **Also motivates the analysis of intertemporal labor supply, human capital and experience dynamics....explore more in Lecture I but first run through some of the key modelling challenges to be addressed in the lectures.**
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- Estimate on household panel data with linked family histories.

- One key challenge is identifying and precisely estimating the role of human capital investments in the pay-off to current employment, - dealing with selection and assessing the importance of complementarities. For example, the structural wage equation...
Wage equation embedded in a dynamic choice model

Consider the following ‘structural’ wage equation: for woman ‘i’, age ‘t’, in each birth cohort; with school level ‘s’, experience ‘e’, labour supply ‘l’.

\[
\ln w_{sit} = \ln W_{sit} + \gamma_s \ln(e_{sit} + 1) + v_{sit} + \xi_{sit}
\]

\[
v_{sit} = \rho_s v_{sit-1} + \mu_{sit}
\]

\[
e_{sit} = e_{sit-1}(1 - \delta_s) + g_s(l_{sit})
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\]

- \( \gamma_{si} \) varies with schooling level \( s \) and family background factors \( x_i \)
- \( v_{sit} \) persistence of shocks - distinguish heterogeneity from state-dependent experience effects. \( \xi_{sit} \) is a transitory shock.
- correlation of initial permanent shock with preferences heterogeneity.
- concave profile of experience effects that differs by schooling level and background factors.
- \( g_s(l_{sit}) \) set to unity for full-time \( g_s(FT) = 1 \), the part-time experience value \( g_s(PT) \) is estimated.
- \( \delta_s \) depreciation of human capital - cost of not working.
Adopt a structural dynamic panel data approach:

- using the time series of tax, tax credit, welfare benefit and tuition reforms for new cohorts of women to identify parameters,
- conditioning on family background variables,
- comparing with quasi-experimental/experimental contrasts where possible.

How important are complementarities between education investments and on-the-job human capital?

Adopt a fairly simple life-cycle model, as in the 2016 Econometrica paper - take as a running example in the next Lecture (I). Use to evaluate the impact, and design, of earned income tax credits.
Labor Supply, Human Capital and Experience Dynamics.

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Lecture II: Consumer Behaviour and Revealed Preference

- Rationality and Revealed Preference.
- Heterogeneity and the Distribution of Counterfactual Demands.
- Taste Change and (environmental) Quality Change.
- What next for the microeconometrics of RP?
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References from my webpage, including
- Blundell, Browning and Crawford [BBC1, 2] (Ecta 2003, 2008)
- Blundell, Horowitz and Parey [BHP1, 2] (QE 2013, REStat 2016)
- Blundell, Kristensen and Matzkin [BKM1, & 2] (JoE 2014, WP 2017)
- Blundell, Browning, Crawford, Vermeulen [BBCV] (AEJ-Mic 2015)
- Adams, Blundell, Browning and Crawford [ABBC] (IFS-WP, 2016)
- Blow and Blundell [BB] (ERE, 2017)
‘Modern’ RP analysis takes a nonparametric approach. To quote McFadden: “parametric models interpose an untidy veil between econometric analysis and the propositions of economic theory”.

Inequality restrictions from revealed preference are used to assess rationality and to improve the estimation of demand responses.
Rationality and Revealed Preference

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- There were two early criticisms of the empirical application of revealed preference theory to consumer behaviour:
  - when it does not reject, it doesn't provide precise predictions; and
  - when it does reject, it doesn't help us characterize the nature of irrationality or the degree/direction of changing tastes.
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- when it does not reject, it doesn't provide precise predictions; and
- when it does reject, it doesn't help us characterize the nature of irrationality or the degree/direction of changing tastes.

We will see that recent developments in the microeconometric application of revealed preference have rendered these criticisms unfounded. For example, the use of expansion paths....
Figure 1a: RP Rejection
Figure 1a: RP Rejection?
Figure 1b: Using Expansion Paths
The analysis extends to:

- Labor supply and nonlinear taxation,
- Collective choice,
- Habits,
- Intertemporal choice,
- Characteristics models.
Challenges to address:

- The Afriat-Diewert-Varian Theorem allows us to characterise ‘well behaved’ preferences through a set of inequalities on observed behaviour \((p^t, q^t)\),
  - but how do we devise a most powerful test for observational data?
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- How do we incorporate unobserved individual heterogeneity?

  - Assume every consumer is characterised by unobserved heterogeneity $(\varepsilon)$ and responds to a given budget $(p, x)$, with a unique, positive $J$—vector of demands $q = d(p, x, \varepsilon)$, and assume conditions on preferences that ensure invertibility in $\varepsilon$,
  - with $J > 2$, new results on multiple goods with nonseparable heterogeneity, for $J = 2$ invertibility is equivalent to monotonicity in $\varepsilon$. 
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  - with \(J > 2\), new results on multiple goods with nonseparable heterogeneity, for \(J = 2\) invertibility is equivalent to monotonicity in \(\varepsilon\).
  - Also ask - how can we account for taste change?
Lecture III: Consumption Smoothing and Partial Insurance

- Panel Data Models of Earnings Dynamics.
- The Relationship Between Earnings Dynamics and Consumption Inequality.
- Consumption Inequality and Mechanisms of Partial Insurance.
- Nonlinear Models of Income Persistence and Consumption Dynamics.
- The Role of Time Use and Family Labor Supply.
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References from my webpage, including

- Blundell, Pistaferri & Preston [BPP], partial insurance.... (AER, 2008)
- Blundell, Low & Preston [BLP], decomposing income risk... (QE, 2013)
- Blundell, Graber & Mogstad [BGM], social insurance.. (JPubE, 2015; 2017)
- Arellano, Blundell & Bonhomme [ABB], nonlinear persistence.... (Ecta, 2017)

Blundell, Pistaferri & Saporta-Eksten [BPS1,2], family labor supply.... (AER, 2016; JPE, 2017)
Some (three!) key challenges:

1. Consumption measurement.
2. Modelling the distributional dynamics of income.
3. Integrating family labour supply and the tax and welfare-benefit system.
1. New data on consumption...

I. Administrative linked data: e.g. Norwegian population register.

- Linked registry databases with unique individual identifiers, e.g. every Norwegian from 1967 to 2006.
  - Detailed demographic and socioeconomic information (market income, cash transfers). Recent links to real estate and assets; and to hours of work. Develop new consumption measurements.

- Family identifiers allow to match spouses and children.
  - see Blundell, Graber and Mogstad (2015).

II. Newly designed panel surveys: e.g. PSID since 1999.

- Collection of consumption and assets had a major revision in 1999: 70% of consumption expenditures. Good match with NIPA. The sum of food at home, food away from home, gasoline, health, transportation, utilities, clothing etc.

- Earnings and hours for all earners; Assets measured in each wave.
  - see Blundell, Pistaferri and Saporta-Eksten (2016).
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     - see Blundell, Pistaferri and Saporta-Eksten (2016).
2. Nonlinear Persistence

Nonlinear Persistence in the PSID

Notes: Pre-tax household labor earnings, Age 30-60 1999-2009 (US). Estimates of the average derivative of the conditional quantile function.

Source: Arellano, Blundell and Bonhomme (2017).
Nonlinear Persistence

Nonlinear Persistence in the Norwegian Register Data

Notes: Norwegian Population Register, Family Earned Income. Estimates of the average derivative of the conditional quantile function.
A twist to the standard ‘permanent-transitory’ model:

- allow for **nonlinear persistence** in the permanent component \( \eta_{it} \).

The persistence of shocks to \( \eta_{it} \) depend on the sign and size of the shock; and also level of \( \eta_{it} \), represented by a conditional quantile model

\[
\eta_{it} = Q_t(\eta_{it}, u_{it})
\]

- quite different from the standard model of income dynamics.

And delivering a new measure of nonlinear persistence.

The final lecture will use this new nonlinear framework to explore the complete distributional dynamics of income, and then the implications for consumption and savings decisions.
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Nonlinear Persistence and Unusual Shocks...

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Family labor supply can play an important role in consumption smoothing of shocks:

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- especially for young families with low assets.
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Family labor supply elasticities are affected by children:
3. Family Labour Supply and Consumption Smoothing?

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- Puzzle: Is labour supply within the family a substitute or a complement?

- Family labor supply elasticities are affected by children:
  
  ![Diagram](image)

  - Frisch Substitutability Of hours of two earners
  - Specialization Younger Children
  - Leisure Complementarity Older Children
  - Frisch Complementarity Of hours of two earners

- When wealth effects are present (Marshallian elasticities): added worker is defined by adjustments in family labor supply as insurance against permanent shocks to spouses earnings.
Labour Supply Models and Policy Analysis

Finish this introductory part of these by returning to some observations on the empirical foundations for policy reform & design.

Consider the role of evidence loosely organised under five headings:

1. Key margins of adjustment.
3. The importance of information and complexity.
4. Evidence on the size of responses.
5. Counterfactual policy simulation and optimal design.

- Drawing from experience in the evaluation of earnings tax policy.
- Headings 4 and 5 lead in to Lecture I.
1. Key margins.....

- **A lifetime view of employment and hours**
  - differences by *extensive and intensive margin* accentuated at particular ages and for particular demographic groups, BBL (*AER*, 2011).
  - higher attachment to the labor market for higher educated, career length matters.

- **Wages grow stronger and longer over the lifetime for higher educated**
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A lifetime view of employment and hours
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Wages grow stronger and longer over the lifetime for higher educated
- human capital profiles in work appear to be complementary to education investments.

The extensive – intensive distinction is important for a number of reasons: The size of extensive and intensive labor supply responses are key parameters for earnings tax design, Saez (2002), Laroque (2005),... A ‘large’ extensive elasticity at low earnings can ‘turn around’ the impact of declining social weights, implying a higher optimal transfer to low earning workers than to those out of work - *earned income tax credits*, see Blundell and Shephard (2012).
2. Measurement of effective incentives

- Precisely how do tax and welfare-benefit policies impact on the incentives?

- Requires detailed institutional knowledge.

- e.g. overlapping taxes, tax credits and welfare benefits.
  
  - What are the effective tax rates?
  
  - What is the ‘treatment’ effect in quasi-experimental analyses?

Notes: Value of tax and value transfer benefits for a single parent with two children.

Notes: Value of tax and value transfer benefits for a single parent with two children.
The interaction of WFTC with other benefits in the UK

Example: Budget Constraint for Single Parent

Source: Mirrlees Review (2011)
3. The importance of information and complexity

- How is policy likely to be understood by the agents involved?
- For example, how ‘salient’ are the various tax and welfare benefit incentives?
  - ‘Take-up’ of welfare and tax credits among eligible families.
  - ‘Bunching’ at kink points.
The interaction of WFTC with other benefits in the UK

Example: Budget Constraint for Single Parent

Source: Mirrlees Review (2011)
Are the hours rules in the UK tax credit system salient?

Single Women (aged 18-45), 2002

Source: Blundell and Shephard (2012)
Bunching at EITC kink points in the US?

Source: Saez (2010)
Variation in tax credit ‘take-up’ with value of entitlement

Example: Budget Constraint for Single Parent

![Graph showing variation in tax credit 'take-up' with WFTC entitlement for Lone Parents and Couples]

Source: Mirrlees Review (2011)
4. Evidence on the size of responses

This is where the microeconometric analysis comes into play. Eclectic mix of two approaches.

1. RCT/RD/diff-in-diff (typically) quasi-experimental evaluations of the impact of specific reforms/treatments
   - ‘robust’ but limited/local in scope.

2. A ‘structural’ estimation based on revealed preference theory/choice pay-offs and constraints
   - comprehensive in scope,
   - allows counterfactual policy simulation and policy design (step 5), but ‘fragile’,
   - needs to account for facts (step 1), effective tax rates (step 2), and salience/stigma (step 3).

A strong complementarity between both approaches... e.g.

- RCT in Canada...
Canadian Self Sufficiency Program

Randomised-Control experimental design:

- Do financial incentives encourage work among low skilled lone parents?
- The aim was to encourage employment among welfare recipients, specifically single parents on welfare
  - 50% earnings supplement – as a tax credit
  - at least 30 hours per week job
  - On earnings up to an annual limit of $36000
- provided to the individual, not the employer, as in EITC & WFTC.
Canadian Self Sufficiency Program

Budget Constraint for a Single Parent on Minimum Wage

![Graph showing budget constraint for a single parent on minimum wage. The graph plots weekly hours of work against income per month ($1995). There are two lines: one for Income Assistance and one for the Self Sufficiency Program.](image-url)
Employment Rate of single mothers by months after RA

Source: Blundell and Moffitt (2010)
Canadian Self Sufficiency Program

Hourly wages by months after RA

Source: Blundell and Moffitt (2010)
Monthly earnings by months after RA

Source: Blundell and Moffitt (2010)
Key elements of a baseline structural labor supply model, Blundell and Shephard (2012)

1. budget constraint - tax/tax-credit and benefit interactions.
2. preferences - multinomial choice across discrete hours.
3. heterogeneity - observed demographics; unobserved heterogeneity.
4. fixed costs of work - observed and unobserved heterogeneity, again.
5. stigma/hassle costs - take-up versus eligibility; unobs het.
6. childcare use and price - key ‘quasi-fixed costs’ of work.
7. restrictions on choice sets - e.g. ‘consideration set’ models, work with Guy Laroque.
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6. **Childcare use and price** - key ‘quasi-fixed costs’ of work.
7. **Restrictions on choice sets** - e.g. ‘consideration set’ models, work with Guy Laroque.

- Leads naturally to the structural model of labour supply in Lecture I.
- Generalise the baseline model to incorporate human capital decisions and experience dynamics.
But first a cautionary note from Frisch (1933!)

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- Statistical information is currently accumulating at an unprecedented rate. But no amount of statistical information, however complete and exact, can by itself explain economic phenomena.
- If we are not to get lost in the overwhelming, bewildering mass of statistical data that are now becoming available, we need the guidance and help of a powerful theoretical framework. Without this no significant interpretation and coordination of our observations will be possible.
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- ...[S]o long as we confine ourselves to statements in general terms about one economic factor having an ‘effect’ on some other factor, almost any sort of relationship may be selected, postulated as a law, and ‘explained’ by a plausible argument."
Outline of the rest of the Lectures...

- Explore empirical approaches to the analysis of consumption, savings and labour supply.

- **Three main lectures:**
  
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  - II. consumer behaviour and revealed preference,
  
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References on my website: http://www.ucl.ac.uk/~uctp39a/
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Female Employment by Age

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Female Labour Market Attachment and Part-time Work

Notes: UK Women. Source: Blundell, Dias, Meghir and Shaw (2016)
Average Log Wages of Women by Age

Notes: UK Women, BHPS. Source: Blundell, Dias, Meghir and Shaw (2016)